Agency for Healthcare Research and Quality
Advancing Excellence in Health Care

NATIONAL GUIDELINE CLEARINGHOUSE

General

Guideline Title

Practice guidelines for moderate procedural sedation and analgesia 2018: a report by the American Society of Anesthesiologists Task Force on Moderate Procedural Sedation and Analgesia, the American Association of Oral and Maxillofacial Surgeons, American College of Radiology, American Dental Association, American Society of Dentist Anesthesiologists, and Society of Interventional Radiology.

Bibliographic Source(s)

Practice guidelines for moderate procedural sedation and analgesia 2018: a report by the American Society of Anesthesiologists Task Force on Moderate Procedural Sedation and Analgesia, the American Association of Oral and Maxillofacial Surgeons, American College of Radiology, American Dental Association, American Society of Dentist Anesthesiologists, and Society of Interventional Radiology. Anesthesiology. 2018 Mar;128(3):437-79. [187 references] PubMed

Guideline Status

This is the current release of the guideline.

This guideline updates a previous version: American Society of Anesthesiologists Task Force on Sedation and Analgesia by Non-Anesthesiologists. Practice guidelines for sedation and analgesia by non-anesthesiologists. Anesthesiology. 2002 Apr;96(4):1004-17. [2 references]

This guideline meets NGC's 2013 (revised) inclusion criteria.

NEATS Assessment

National Guideline Clearinghouse (NGC) has assessed this guideline's adherence to standards of trustworthiness, derived from the Institute of Medicine's report Clinical Practice Guidelines We Can Trust.

= Poor = Fair = Good = Very Good = Excellent

Assessment	Standard of Trustworthiness
YES	Disclosure of Guideline Funding Source

▮▮▮▮▯	Disclosure and Management of Financial Conflict of Interests
	Guideline Development Group Composition
YES	Multidisciplinary Group
YES	Methodologist Involvement
▮▯▯▯▯	Patient and Public Perspectives
	Use of a Systematic Review of Evidence
▮▮▮▮▮	Search Strategy
▮▮▮▮▮	Study Selection
▮▮▮▮▮	Synthesis of Evidence
	Evidence Foundations for and Rating Strength of Recommendations
▮▮▮▮▮	Grading the Quality or Strength of Evidence
▮▮▮▮▮	Benefits and Harms of Recommendations
▮▮▮▮▮	Evidence Summary Supporting Recommendations
▮▮▯▯▯	Rating the Strength of Recommendations
▮▮▮▮▮	Specific and Unambiguous Articulation of Recommendations
▮▮▮▯▯	External Review
▮▮▮▮▮	Updating

Recommendations

Major Recommendations

Patient Evaluation

Review previous medical records and interview the patient or family to identify:

- Abnormalities of the major organ systems (e.g., cardiac, renal, pulmonary, neurologic, sleep apnea, metabolic, endocrine)
- Adverse experience with sedation/analgesia, as well as regional and general anesthesia
- History of a difficult airway
- Current medications, potential drug interactions, drug allergies, and nutraceuticals
- History of tobacco, alcohol or substance use or abuse
- Frequent or repeated exposure to sedation/analgesic agents

Conduct a focused physical examination of the patient (e.g., vital signs, auscultation of the heart and lungs, evaluation of the airway,* and when appropriate to sedation, other organ systems where major abnormalities have been identified)

Review available laboratory test results

Order additional laboratory tests guided by a patient's medical condition, physical examination, and the likelihood that the results will affect the management of moderate sedation/analgesia

Evaluate results of these tests before sedation is initiated

If possible, perform the preprocedure evaluation well enough in advance (e.g., several days to weeks) to allow for optimal patient preparation†

Reevaluate the patient immediately before the procedure.

*See Table 2 in the original guideline document for additional information related to airway assessment.

†This may not be feasible for urgent or emergency procedures, interventional radiology or other radiology settings.

Preprocedure Patient Preparation

Consult with a medical specialist (e.g., physician anesthesiologist, cardiologist, endocrinologist, pulmonologist, nephrologist, pediatrician, obstetrician, or otolaryngologist), when appropriate before administration of moderate procedural sedation to patients with significant underlying conditions

If a specialist is needed, select a specialist based on the nature of the underlying condition and the urgency of the situation

For severely compromised or medically unstable patients (e.g., American Society of Anesthesiologists [ASA] status IV, anticipated difficult airway, severe obstructive pulmonary disease, coronary artery disease, or congestive heart failure) or if it is likely that sedation to the point of unresponsiveness will be necessary to obtain adequate conditions, consult with a physician anesthesiologist

Before the procedure, inform patients or legal guardians of the benefits, risks, and limitations of moderate sedation/analgesia and possible alternatives, and elicit their preferences‡

Inform patients or legal guardians before the day of the procedure that they should not drink fluids or eat solid foods for a sufficient period of time to allow for gastric emptying before the procedure§

On the day of the procedure, assess the time and nature of last oral intake

Evaluate the risk of pulmonary aspiration of gastric contents when determining (1) the target level of sedation and (2) whether the procedure should be delayed

In urgent or emergent situations where complete gastric emptying is not possible, do not delay moderate procedural sedation based on fasting time alone

‡This may not be feasible for urgent or emergency procedures.

§See Table 3 in the original guideline document and/or refer to the National Guideline Clearinghouse (NGC) summary of the ASA guideline Practice guidelines for preoperative fasting and the use of pharmacologic agents to reduce the risk of pulmonary aspiration.

Patient Monitoring

Monitoring Patient Level of Consciousness

Periodically (e.g., at 5-min intervals) monitor a patient's response to verbal commands during moderate sedation, except in patients who are unable to respond appropriately (e.g., patients where age or development may impair bidirectional communication) or during procedures where movement could be detrimental

During procedures where a verbal response is not possible (e.g., oral surgery, restorative dentistry, upper endoscopy), check the patient's ability to give a "thumbs up" or other indication of consciousness in response to verbal or tactile (light tap) stimulation; this suggests that the patient will be able to control his airway and take deep breaths if necessaryâ•`

â•`A response limited to reflex withdrawal from a painful stimulus is not considered a purposeful response and thus represents a state of general anesthesia.

Monitoring Patient Ventilation and Oxygenation

Continually# monitor ventilatory function by observation of qualitative clinical signs

Continually monitor ventilatory function with capnography unless precluded or invalidated by the nature of the patient, procedure, or equipment

For uncooperative patients, institute capnography after moderate sedation has been achieved

Continuously monitor all patients by pulse oximetry with appropriate alarms

Monitoring Hemodynamics

Determine blood pressure before sedation/analgesia is initiated unless precluded by lack of patient cooperation

Once moderate sedation/analgesia is established, continually monitor blood pressure (e.g., at 5-min intervals) and heart rate during the procedure unless such monitoring interferes with the procedure (e.g., magnetic resonance imaging where stimulation from the blood pressure cuff could arouse an appropriately sedated patient)

Use electrocardiographic monitoring during moderate sedation in patients with clinically significant cardiovascular disease or those who are undergoing procedures where dysrhythmias are anticipated

#The term "continual" is defined as "repeated regularly and frequently in steady rapid succession" whereas "continuous" means "prolonged without any interruption at any time" (see Standards for Basic Anesthetic Monitoring, American Society of Anesthesiologists. Approved by the ASA House of Delegates October 21, 1986, and last amended October 28, 2015. Retrieved May 9, 2017, from the ASA Web site).

Contemporaneous Recording of Monitored Parameters

Record patients' level of consciousness, ventilatory and oxygenation status, and hemodynamic variables at a frequency that depends on the type and amount of medication administered, the length of the procedure, and the general condition of the patient

At a minimum, this should occur: (1) before the administration of sedative/analgesic agents,** (2) after administration of sedative/analgesic agents, (3) at regular intervals during the procedure, (4) during initial recovery, and (5) just before discharge

Set device alarms to alert the care team to critical changes in patient status

**For rare uncooperative patients (e.g., children with autism spectrum disorder or attention deficit disorder) recording oxygenation status or blood pressure may not be possible until after sedation.

Availability of an Individual Responsible for Patient Monitoring

Assure that a designated individual other than the practitioner performing the procedure is present to monitor the patient throughout the procedure

The individual responsible for monitoring the patient should be trained in the recognition of apnea and airway obstruction and be authorized to seek additional help

The designated individual may assist with minor, interruptible tasks once the patient's level of sedation/analgesia and vital signs have stabilized, provided that adequate monitoring for the patient's level of sedation is maintained

Supplemental Oxygen

Use supplemental oxygen during moderate procedural sedation/analgesia unless specifically contraindicated for a particular patient or procedure

Emergency Support

Assure that pharmacologic antagonists for benzodiazepines and opioids are immediately available in the procedure suite or procedure room††

Assure that an individual is present in the room who understands the pharmacology of the sedative/analgesics administered (e.g., opioids and benzodiazepines) and potential interactions with other medications and nutraceuticals the patient may be taking

Assure that appropriately sized equipment for establishing a patent airway is available

Assure that at least one individual capable of establishing a patent airway and providing positive pressure ventilation is present in the procedure room

Assure that suction, advanced airway equipment, a positive pressure ventilation device, and supplemental oxygen are immediately available in the procedure room and in good working order

Assure that a member of the procedural team is trained in the recognition and treatment of airway complications (e.g., apnea, laryngospasm, airway obstruction), opening the airway,

suctioning secretions, and performing bag-valve-mask ventilation

Assure that a member of the procedural team has the skills to establish intravascular access

Assure that a member of the procedural team has the skills to provide chest compressions

Assure that a functional defibrillator or automatic external defibrillator is immediately available in the procedure area

Assure that an individual or service (e.g., code blue team, paramedic-staffed ambulance service) with advanced life support skills (e.g., tracheal intubation, defibrillation, resuscitation medications) is immediately available

Assure that members of the procedural team are able to recognize the need for additional support and know how to access emergency services from the procedure room (e.g., telephone, call button)

††"Immediately available in the procedure room" refers to accessible shelving, unlocked cabinetry, and other measures to assure that there is no delay in accessing medications and equipment during the procedure.

Sedative or Analgesic Medications Not Intended for General Anesthesia

Combinations of sedative and analgesic agents may be administered as appropriate for the procedure and the condition of the patient‡‡

Administer each component individually to achieve the desired effect (e.g., additional analgesic medication to relieve pain; additional sedative medication to decrease awareness or anxiety)

Dexmedetomidine may be administered as an alternative to benzodiazepine sedatives on a case-by-case basis

In patients receiving intravenous medications for sedation/analgesia, maintain vascular access throughout the procedure and until the patient is no longer at risk for cardiorespiratory depression

In patients who have received sedation/analgesia by nonintravenous routes or whose intravenous line has become dislodged or blocked, determine the advisability of reestablishing intravenous access on a case-by-case basis

Administer intravenous sedative/analgesic drugs in small, incremental doses, or by infusion, titrating to the desired endpoints

Allow sufficient time to elapse between doses so the peak effect of each dose can be assessed before subsequent drug administration

When drugs are administered by nonintravenous routes (e.g., oral, rectal, intramuscular, transmucosal), allow sufficient time for absorption and peak effect of the previous dose to occur before supplementation is considered

‡‡The propensity for combinations of sedative and analgesic agents to cause respiratory depression and airway obstruction emphasizes the need to appropriately reduce the dose of each component as well as the need to continually monitor respiratory function. Knowledge of each drug's time of onset, peak response, and duration of action is important. Titration of drug to effect is an important concept; one must know whether the previous dose has taken full effect before administering additional drug.

Sedative/Analgesic Medications Intended for General Anesthesia

When moderate procedural sedation with sedative/analgesic medications intended for general anesthesia by any route is intended, provide care consistent with that required for general anesthesia

Assure that practitioners administering sedative/analgesic medications intended for general anesthesia are able to reliably identify and rescue patients from unintended deep sedation or general anesthesia

For patients receiving intravenous sedative/analgesics intended for general anesthesia, maintain vascular access throughout the procedure and until the patient is no longer at risk for cardiorespiratory depression

In patients who have received sedative/analgesic medications intended for general anesthesia by nonintravenous routes or whose intravenous line has become dislodged or blocked, determine the advisability of reestablishing intravenous access on a case-by-case basis

Administer intravenous sedative/analgesic medications intended for general anesthesia in small, incremental doses, or by infusion, titrating to the desired endpoints

Allow sufficient time to elapse between doses so the peak effect of each dose can be assessed before subsequent drug administration

When drugs intended for general anesthesia are administered by nonintravenous routes (e.g., oral, rectal, intramuscular, transmucosal), allow sufficient time for absorption and peak effect of the previous dose to occur before supplementation is considered

Reversal Agents

Assure that specific antagonists are immediately available in the procedure room whenever opioid analgesics or benzodiazepines are administered for moderate procedural sedation/analgesia, regardless of route of administration

If patients develop hypoxemia, significant hypoventilation or apnea during sedation/analgesia: (1) encourage or physically stimulate patients to breathe deeply, (2) administer supplemental oxygen, and (3) provide positive pressure ventilation if spontaneous ventilation is inadequate

Use reversal agents in cases where airway control, spontaneous ventilation, or positive pressure ventilation is inadequate

Administer naloxone to reverse opioid-induced sedation and respiratory depression§§

Administer flumazenil to reverse benzodiazepine-induced sedation and respiratory depression

After pharmacologic reversal, observe and monitor patients for a sufficient time to ensure that sedation and cardiorespiratory depression does not recur once the effect of the antagonist dissipates

Do not use sedation regimens that are intended to include routine reversal of sedative or analgesic agents

§§Practitioners are cautioned that acute reversal of opioid-induced analgesia may result in pain, hypertension, tachycardia, or pulmonary edema.

Recovery Care

After sedation/analgesia, observe and monitor patients in an appropriately staffed and equipped area until they are near their baseline level of consciousness and are no longer at increased risk for cardiorespiratory depression

Monitor oxygenation continuously until patients are no longer at risk for hypoxemia

Monitor ventilation and circulation at regular intervals (e.g., every 5 to 15 min) until patients are suitable for discharge

Design discharge criteria to minimize the risk of central nervous system or cardiorespiratory depression after discharge from observation by trained personnelâ•'â•'

â•'â•'Discharge criteria examples are noted in table 5 (see the original guideline document).

Creation and Implementation of Patient Safety Processes

Create and implement a quality improvement process based upon established national, regional, or institutional reporting protocols (e.g., adverse events, unsatisfactory sedation)

Periodically update the quality improvement process to keep up with new technology, equipment or other advances in moderate procedural sedation/analgesia

Strengthen patient safety culture through collaborative practices (e.g., team training, simulation drills, development and implementation of checklists)

Create an emergency response plan (e.g., activating "code blue" team or activating the emergency medical response system: 911 or equivalent)

Clinical Algorithm(s)

None provided

Scope

Disease/Condition(s)

Diseases or conditions that require diagnostic or therapeutic procedures involving administration of moderate sedation or analgesia

Guideline Category

Evaluation

Management

Clinical Specialty

Anesthesiology

Family Practice

Pediatrics

Intended Users

Advanced Practice Nurses

Allied Health Personnel

Nurses

Physician Assistants

Physicians

Guideline Objective(s)

- To allow clinicians to optimize the benefits of moderate procedural sedation regardless of site of service
- To guide practitioners in appropriate patient selection
- To decrease the risk of adverse patient outcomes (e.g., apnea, airway obstruction, respiratory arrest, cardiac arrest, death)
- To encourage sedation education, training, and research
- To offer evidence-based data to promote cross-specialty consistency for moderate sedation practice

Target Population

Any patient having a diagnostic or therapeutic procedure for which moderate sedation is planned

Note: The guidelines exclude patients who are not undergoing a diagnostic or therapeutic procedure (e.g., postoperative analgesia). The guidelines do not apply to patients receiving deep sedation, general anesthesia, or major conduction (i.e., neuraxial) anesthesia.

Interventions and Practices Considered

1. Preprocedure patient evaluation and preparation
    - Patient history/condition
    - Focused physical examination
    - Review of laboratory tests
    - Consultation with a medical specialist
    - Preparation of the patient

2. Patient monitoring
    - Level of consciousness
    - Ventilation and oxygenation
    - Hemodynamic monitoring (blood pressure, heart rate, electrocardiography)
    - Contemporaneous recording of monitored parameters
    - Presence of an individual dedicated to patient monitoring
3. Supplemental oxygen versus room air or no supplemental oxygen
4. Emergency support (presence of appropriate staff and equipment)
5. Use of sedative or analgesic medications not intended for general anesthesia
6. Use of sedative/analgesic medications intended for general anesthesia
7. Reversal agents
8. Recovery care

Major Outcomes Considered

- Sedation efficacy
- Pain management (i.e., pain during a procedure)
- Speed of recovery
- Frequency/severity of sedation-related complications

Methodology

Methods Used to Collect/Select the Evidence

Hand-searches of Published Literature (Primary Sources)

Hand-searches of Published Literature (Secondary Sources)

Searches of Electronic Databases

Description of Methods Used to Collect/Select the Evidence

Availability of Evidence

Preparation of these updated guidelines followed a rigorous methodological process. Evidence was obtained from two principal sources: scientific evidence and opinion-based evidence (see appendix 2 in the original guideline document for detailed methods and analyses).

State of the Literature

For the systematic review, potentially relevant clinical studies were identified via electronic and manual searches. Healthcare database searches included PubMed, EMBASE, Web of Science, Google Books, and the Cochrane Central Register of Controlled Trials. The searches covered a 15.6-year period from January 1, 2002, through July 31, 2017. Accepted studies from the previous guidelines were also rereviewed, covering the period of August 1, 1976, through December 31, 2002. Only studies containing original findings from peer-reviewed journals were acceptable. Editorials, letters, and other articles without data were excluded. A literature search strategy and preferred reporting items of systematic reviews and meta-analyses (PRISMA) flow diagram are available as Supplemental Digital Content 2 (see the "Availability of Companion Documents" field).

In total, 4,349 new citations were identified, with 1,428 articles assessed for eligibility. After review, 1,140 were excluded, with 288 new studies meeting the above stated criteria. These studies were combined with 209 pre-2002 articles used in the previous guidelines. In the guideline, 187 are referenced,

with a complete bibliography of articles used to develop these guidelines, organized by section, available as Supplemental Digital Content 3 (see the "Availability of Companion Documents" field).

Number of Source Documents

A total of 497 articles were accepted as evidence for these guidelines

Methods Used to Assess the Quality and Strength of the Evidence

Expert Consensus

Weighting According to a Rating Scheme (Scheme Given)

Rating Scheme for the Strength of the Evidence

Scientific Evidence

Findings from the aggregated literature are reported in the text of the original guideline document by evidence category, level, and direction. Evidence categories refer specifically to the strength and quality of the *research design* of the studies. Category A evidence represents results obtained from randomized controlled trials (RCTs), and category B evidence represents observational results obtained from nonrandomized study designs or RCTs without pertinent comparison groups. When available, category A evidence is given precedence over category B evidence for any particular outcome. These evidence categories are further divided into evidence levels. Evidence levels refer specifically to the strength and quality of the summarized study *findings* (i.e., statistical findings, type of data, and the number of studies reporting/replicating the findings). In this document, only the highest level of evidence is included in the summary report for each intervention–outcome pair, including a directional designation of benefit, harm, or equivocality.

Category A

RCTs report comparative findings between clinical interventions for specified outcomes. Statistically significant ($P<0.01$) outcomes are designated as either beneficial (B) or harmful (H) for the patient; statistically nonsignificant findings are designated as equivocal (E).

Level 1: The literature contains a sufficient number of RCTs to conduct meta-analysis,â•‘ and meta-analytic findings from these aggregated studies are reported as evidence.

Level 2: The literature contains multiple RCTs, but the number of RCTs is not sufficient to conduct a viable meta-analysis for the purpose of these guidelines. Findings from these RCTs are reported separately as evidence.

Level 3: The literature contains a single RCT and findings from this study are reported as evidence.

â•‘All meta-analyses are conducted by the ASA methodology group. Meta-analyses from other sources are reviewed but not included as evidence in this document. A minimum of five independent RCTs are required for meta-analysis.

Category B

Observational studies or RCTs without pertinent comparison groups may permit inference of beneficial or harmful relationships among clinical interventions and clinical outcomes. Inferred findings are given a directional designation of beneficial (B), harmful (H), or equivocal (E). For studies that report statistical findings, the threshold for significance is $P<0.01$.

Level 1: The literature contains nonrandomized comparisons (e.g., quasiexperimental, cohort [prospective or retrospective], or case-control research designs) with comparative statistics between clinical interventions for a specified clinical outcome.

Level 2: The literature contains noncomparative observational studies with associative statistics (e.g., relative risk, correlation, sensitivity, and specificity).

Level 3: The literature contains noncomparative observational studies with descriptive statistics (e.g., frequencies, percentages).

Level 4: The literature contains case reports.

Insufficient Literature

The *lack* of sufficient scientific evidence in the literature may occur when the evidence is either unavailable (i.e., no pertinent studies found) or inadequate. Inadequate literature cannot be used to assess relationships among clinical interventions and outcomes because a clear interpretation of findings is not obtained due to methodological concerns (e.g., confounding of study design or implementation) or the study does not meet the criteria for content as defined in the "Focus" of the guidelines.

Opinion-based Evidence

All opinion-based evidence (e.g., survey data, open forum testimony, internet-based comments, letters, and editorials) relevant to each topic was considered in the development of these guidelines. However, only the findings obtained from formal surveys are reported in the document.

Opinion surveys were developed by the task force to address each clinical intervention identified in the document. Identical surveys were distributed to expert consultants and a random sample of members of the participating organizations.

Expert and Participating Membership Opinion Surveys

Survey findings from task force–appointed expert consultants, a random sample of the American Society of Anesthesiology (ASA) membership, and membership samples from the American Association of Oral and Maxillofacial Surgeons (AAOMS) and the American Society of Dentist Anesthesiologists (ASDA) are fully reported in this document. Survey responses were recorded using a 5-point scale and summarized based on median values.

Strongly Agree: Median score of 5 (at least 50% of the responses are 5)

Agree: Median score of 4 (at least 50% of the responses are 4 or 4 and 5)

Equivocal: Median score of 3 (at least 50% of the responses are 3, or no other response category or combination of similar categories contain at least 50% of the responses)

Disagree: Median score of 2 (at least 50% of responses are 2 or 1 and 2)

Strongly Disagree: Median score of 1 (at least 50% of responses are 1)

Informal Opinion

Open forum testimony obtained during development of these guidelines, internet-based comments, letters, and editorials are all informally evaluated and discussed during the formulation of guideline recommendations. When warranted, the task force may add educational information or cautionary notes based on this information.

Methods Used to Analyze the Evidence

Meta-Analysis

Systematic Review with Evidence Tables

Description of the Methods Used to Analyze the Evidence

Results for each pertinent outcome were summarized, and when sufficient numbers of randomized controlled trials (RCTs) were found, study grading and meta-analyses were conducted. The literature relating to six evidence linkages contained enough studies with well defined experimental designs and statistical information to conduct formal meta-analyses. These six evidence linkages are: (1) capnography versus blinded capnography, (2) supplemental oxygen versus no supplemental oxygen, (3) midazolam combined with opioids versus midazolam alone, (4) propofol versus midazolam, (5) flumazenil versus placebo for benzodiazepine reversal, and (6) flumazenil versus placebo for reversal of benzodiazepines combined with opioids (see Table 6 in the original guideline document). Fixed and random-effects odds ratios are reported for dichotomous outcomes, and raw and standardized mean differences are reported for findings with continuous data. An acceptable significance level was set at $P<0.01$. No search for unpublished studies was conducted, and no reliability tests for locating research results were done.

Interobserver agreement among task force members and two methodologists was obtained by interrater reliability testing of 36 randomly selected studies. Agreement levels using a κ statistic for two-rater agreement pairs were as follows: (1) research design, κ = 0.57 to 0.92; (2) type of analysis, κ = 0.60 to 0.75; (3) evidence linkage assignment, κ = 0.76 to 0.85; and (4) literature inclusion for database, κ = 0.28 to 1.00. Three-rater κ values were: (1) research design, κ = 0.70; (2) type of analysis, κ = 0.68; (3) linkage assignment, κ = 0.79; and (4) literature database inclusion, κ = 0.43. These values represent moderate to high levels of agreement.

Consensus-based Evidence

Consensus was obtained from multiple sources, including: (1) survey opinion from consultants† who were selected based on their knowledge or expertise in moderate procedural sedation and analgesia; (2) survey opinions from a randomly selected sample of active members of the American Society of Anesthesiology (ASA), American Association of Oral and Maxillofacial Surgeons (AAOMS), and American Society of Dentist Anesthesiologists (ASDA)‡; (3) testimony from attendees of publicly held open forums at national anesthesia meetings§; (4) internet commentary; and (5) task force opinion and interpretation. The survey rate of return was 81% (n=129 of 159) for consultants. For membership respondents, survey data were collected from 69 ASA members, 104 AAOMS members, and 104 ASDA members. The results of the surveys are reported in Tables 7–10 in the original guideline document and are summarized in the text of the guidelines.

Consultants were asked to indicate which, if any, of the evidence linkages would change their clinical practices if the guidelines were instituted. The rate of return was 34.6% (n=55 of 159). The percent of responding consultants expecting no change associated with each linkage were as follows (preprocedure patient evaluation – %): preprocedure patient preparation – 93.75%; patient preparation – 87.5%; patient monitoring – 68.75%; supplemental oxygen – 93.75%; emergency support – 87.5%; sedative or analgesic medications not intended for general anesthesia – 87.5%; sedative or analgesic medications intended for general anesthesia – 75.0%%; availability/use of reversal agents – 87.5%; recovery care – 75%; and creation and implementation of patient safety processes – 56.25%. Forty-four respondents (84.62%) indicated that the guidelines would have *no effect* on the amount of time spent on a typical case with the implementation of these guidelines. Seven respondents (13.46%) indicated that there would be an increase in the amount of time, with four of these respondents estimating an increase ranging from 5 to 15 min. One respondent (1.92%) estimated a decrease in the amount of time they would spend on a typical case.

†Consultants were drawn from the following specialties where moderate procedural sedation/analgesia are commonly administered: anesthesiology, cardiology, dentistry, emergency medicine, gastroenterology, oral and maxillofacial surgery, pediatrics, radiology, and surgery.

‡All participating organizations were invited to participate in this survey.

§American Dental Association Council on Dental Education and Licensure: Anesthesia Committee Meeting, April 20, 2017; 2017 Combined Annual Meeting of the Southwest Society of Oral and Maxillofacial Surgeons, the Texas Society of Oral and Maxillofacial Surgeons, the Midwestern Chapter of Oral and Maxillofacial Surgeons, and the Oklahoma Society of Oral and Maxillofacial Surgeons, April 21, 2017, Scottsdale, Arizona; the Society for Ambulatory Anesthesia 32nd Annual Meeting, May 5, 2017, Scottsdale, Arizona; International Anesthesia Research Society 2017 Annual Meeting; and the International Science Symposium, Washington, D.C., May 8, 2017.

Methods Used to Formulate the Recommendations

Expert Consensus

Description of Methods Used to Formulate the Recommendations

Task Force Members and Consultants

These guidelines were developed by an American Society of Anesthesiology (ASA)–appointed task force of 13 members, consisting of physician anesthesiologists in both private and academic practices from various geographic areas of the United States, a cardiologist, a dentist anesthesiologist, an oral/maxillofacial surgeon, a radiologist, an ASA staff methodologist, and two consulting methodologists for the ASA Committee on Standards and Practice Parameters.

The task force developed these guidelines by means of a seven-step process. First, criteria for evidence associated with moderate sedation and analgesia techniques were established. Second, original published research studies relevant to the guidelines were reviewed and analyzed; only articles relevant to the administration of moderate sedation were evaluated. Third, a panel of expert consultants was asked to (1) participate in opinion surveys on the effectiveness and safety of various methods and interventions that might be used during sedation/analgesia and (2) review and comment on a draft of the guidelines developed by the task force. Fourth, survey opinions about the guideline recommendations were solicited from a random sample of active members of the ASA and participating medical specialty societies. Fifth, the task force held open forums at major national meetings to solicit input on its draft recommendations.§ National organizations representing specialties whose members typically provide moderate sedation were invited to participate in the open forums. Sixth, the consultants were surveyed to assess their opinions on the feasibility of implementing the guidelines. Seventh, all available information was used to build consensus within the task force to finalize the guidelines.

§American Dental Association Council on Dental Education and Licensure: Anesthesia Committee Meeting, April 20, 2017; 2017 Combined Annual Meeting of the Southwest Society of Oral and Maxillofacial Surgeons, the Texas Society of Oral and Maxillofacial Surgeons, the Midwestern Chapter of Oral and Maxillofacial Surgeons, and the Oklahoma Society of Oral and Maxillofacial Surgeons, April 21, 2017, Scottsdale, Arizona; the Society for Ambulatory Anesthesia 32nd Annual Meeting, May 5, 2017, Scottsdale, Arizona; International Anesthesia Research Society 2017 Annual Meeting; and the International Science Symposium, Washington, D.C., May 8, 2017

Rating Scheme for the Strength of the Recommendations

After review of all evidentiary information, the task force placed each recommendation into one of three categories: (1) provide this intervention or treatment, (2) this intervention or treatment may be provided to the patient based on circumstances of the case and the practitioner's clinical judgment, or (3) do not provide this intervention or treatment.

Cost Analysis

A formal cost analysis was not performed and published cost analyses were not reviewed.

Method of Guideline Validation

External Peer Review

Internal Peer Review

Description of Method of Guideline Validation

The task force held open forums at major national meetings to solicit input on its draft recommendations. National organizations representing specialties whose members typically provide moderate sedation were

invited to participate in the open forums.

These guidelines were submitted for publication September 1, 2017; accepted for publication November 22, 2017; approved by the American Society of Anesthesiology (ASA) House of Delegates on October 25, 2017; approved by the American Association of Oral and Maxillofacial Surgeons on September 23, 2017; the American College of Radiology on October 5, 2017; the American Dental Association on September 21, 2017; the American Society of Dentist Anesthesiologists on September 15, 2017; and the Society of Interventional Radiology on September 15, 2017.

Evidence Supporting the Recommendations

Type of Evidence Supporting the Recommendations

Evidence was obtained from two principal sources: scientific evidence and opinion-based evidence.

Benefits/Harms of Implementing the Guideline Recommendations

Potential Benefits

- Many of the complications associated with moderate sedation and analgesia may be avoided if adverse drug responses are detected and treated in a timely manner (i.e., before the development of cardiovascular decompensation or cerebral hypoxia).
- Moderate sedation/analgesia provides patient tolerance of unpleasant or prolonged procedures through relief of anxiety, discomfort, and/or pain.
- Expected benefits include sedation efficacy, improved pain management (i.e., pain during a procedure), speed of recovery, and reduced frequency/severity of sedation-related complications.

Refer to the "Literature Findings" sections in the original guideline document for potential benefits of specific interventions.

Potential Harms

- Observational studies indicate that some adverse outcomes (e.g., unintended deep sedation, hypoxemia, or hypotension) may occur in patients with preexisting medical conditions when moderate sedation/analgesia is administered.
- Practitioners are cautioned that acute reversal of opioid-induced analgesia may result in pain, hypertension, tachycardia, or pulmonary edema.
- If the patient response results in deeper sedation than intended, these sedation practices can be associated with cardiac or respiratory depression that must be rapidly recognized and appropriately managed to avoid the risk of hypoxic brain damage, cardiac arrest, or death. Conversely, inadequate sedation or analgesia can result in undue patient discomfort or patient injury, lack of cooperation, or adverse physiological or psychological responses to stress.

Refer to the "Literature Findings" sections in the original guideline document for potential harms of specific interventions.

Qualifying Statements

Qualifying Statements

- These guidelines specifically apply to the level of sedation corresponding to moderate sedation/analgesia (previously called conscious sedation), which is defined as a drug-induced depression of consciousness during which patients respond purposefully† to verbal commands, either alone or accompanied by light tactile stimulation. (Reflex withdrawal from a painful stimulus is NOT considered a purposeful response.) No interventions are required to maintain a patent airway when spontaneous ventilation is adequate.‡ Cardiovascular function is usually maintained. For these guidelines, analgesia refers to the management of patient pain or discomfort during and after procedures requiring moderate sedation.
- The appropriate choice of agents and techniques for moderate sedation/analgesia is dependent upon the experience, training, and preference of the individual practitioner, requirements or constraints imposed by associated medical issues of the patient or type of procedure, and the risk of producing a deeper level of sedation than anticipated. In some cases, the choice of agents or techniques are limited by federal, state, or municipal regulations or statutes. Because it is not always possible to predict how a specific patient will respond to sedative and analgesic medications, practitioners intending to produce a given level of sedation should be able to rescue patients whose level of sedation becomes deeper than initially intended. For moderate sedation, this implies the ability to manage a compromised airway or hypoventilation, and support cardiovascular function in patients who become hypotensive, hypertensive, bradycardic, or tachycardic.
- Because minimal sedation (anxiolysis) may entail minimal risk, the guidelines specifically exclude it. Additional interventions excluded from these guidelines include but are not limited to patient-controlled sedation/analgesia, sedatives administered before or during regional and central neuraxis anesthesia, premedication for general anesthesia, interventions without sedatives (e.g., hypnosis, acupuncture), new or rarely administered sedative/analgesics, new or rarely used monitoring or delivery devices, and automated sedative delivery systems. These guidelines do not address education, training, or certification requirements for practitioners who provide moderate procedural sedation.
- Practice guidelines are systematically developed recommendations that assist the practitioner and patient in making decisions about health care. These recommendations may be adopted, modified, or rejected according to clinical needs and constraints and are not intended to replace local institutional policies. In addition, these practice guidelines are not intended as standards or absolute requirements, and their use cannot guarantee any specific outcome. Practice guidelines are subject to revision as warranted by the evolution of medical knowledge, technology, and practice. They provide basic recommendations that are supported by a synthesis and analysis of the current literature, expert and practitioner opinion, open forum commentary, and clinical feasibility data.

†Reflex withdrawal from a painful stimulus is NOT considered a purposeful response.

‡However, as stated in the American Academy of Pediatrics–American Academy of Pediatric Dentistry guidelines on the monitoring and management of pediatric patients during sedation (2016), "in the case of procedures that may themselves cause airway obstruction (e.g., dental or endoscopic), the practitioner must recognize an obstruction and assist the patient in opening the airway."

Implementation of the Guideline

Description of Implementation Strategy

An implementation strategy was not provided.

Institute of Medicine (IOM) National Healthcare Quality Report Categories

IOM Care Need

IOM Care Need

Getting Better

Staying Healthy

IOM Domain

Effectiveness

Patient-centeredness

Safety

Identifying Information and Availability

Bibliographic Source(s)

Practice guidelines for moderate procedural sedation and analgesia 2018: a report by the American Society of Anesthesiologists Task Force on Moderate Procedural Sedation and Analgesia, the American Association of Oral and Maxillofacial Surgeons, American College of Radiology, American Dental Association, American Society of Dentist Anesthesiologists, and Society of Interventional Radiology. Anesthesiology. 2018 Mar;128(3):437-79. [187 references] PubMed

Adaptation

Not applicable: The guideline was not adapted from another source.

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Guideline Developer(s)

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American Society of Anesthesiologists - Medical Specialty Society

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The authors declare no competing interests.

Guideline Status

This is the current release of the guideline.

This guideline updates a previous version: American Society of Anesthesiologists Task Force on Sedation and Analgesia by Non-Anesthesiologists. Practice guidelines for sedation and analgesia by non-anesthesiologists. Anesthesiology. 2002 Apr;96(4):1004-17. [2 references]

This guideline meets NGC's 2013 (revised) inclusion criteria.

Guideline Availability

Available from the Anesthesiology Journal Web site .

Availability of Companion Documents

The following are available:

- Practice guidelines for moderate procedural sedation and analgesia 2018: a report by the American Society of Anesthesiologists Task Force on Moderate Procedural Sedation and Analgesia, the American Association of Oral and Maxillofacial Surgeons, American College of Radiology, American Dental Association, American Society of Dentist Anesthesiologists, and Society of Interventional Radiology. Literature search strategy and PRISMA flow diagram. Schaumburg (IL): American Society of Anesthesiologists; 2018. 19 p. Available from the Anesthesiology Journal Web site .
- Practice guidelines for moderate procedural sedation and analgesia 2018: a report by the American Society of Anesthesiologists Task Force on Moderate Procedural Sedation and Analgesia, the American Association of Oral and Maxillofacial Surgeons, American College of Radiology, American Dental Association, American Society of Dentist Anesthesiologists, and Society of Interventional Radiology. Bibliography. Schaumburg (IL): American Society of Anesthesiologists; 2018. 31 p. Available from the Anesthesiology Journal Web site .

Patient Resources

None available

NGC Status

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